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THE  
CANE GROWERS'  
QUARTERLY BULLETIN

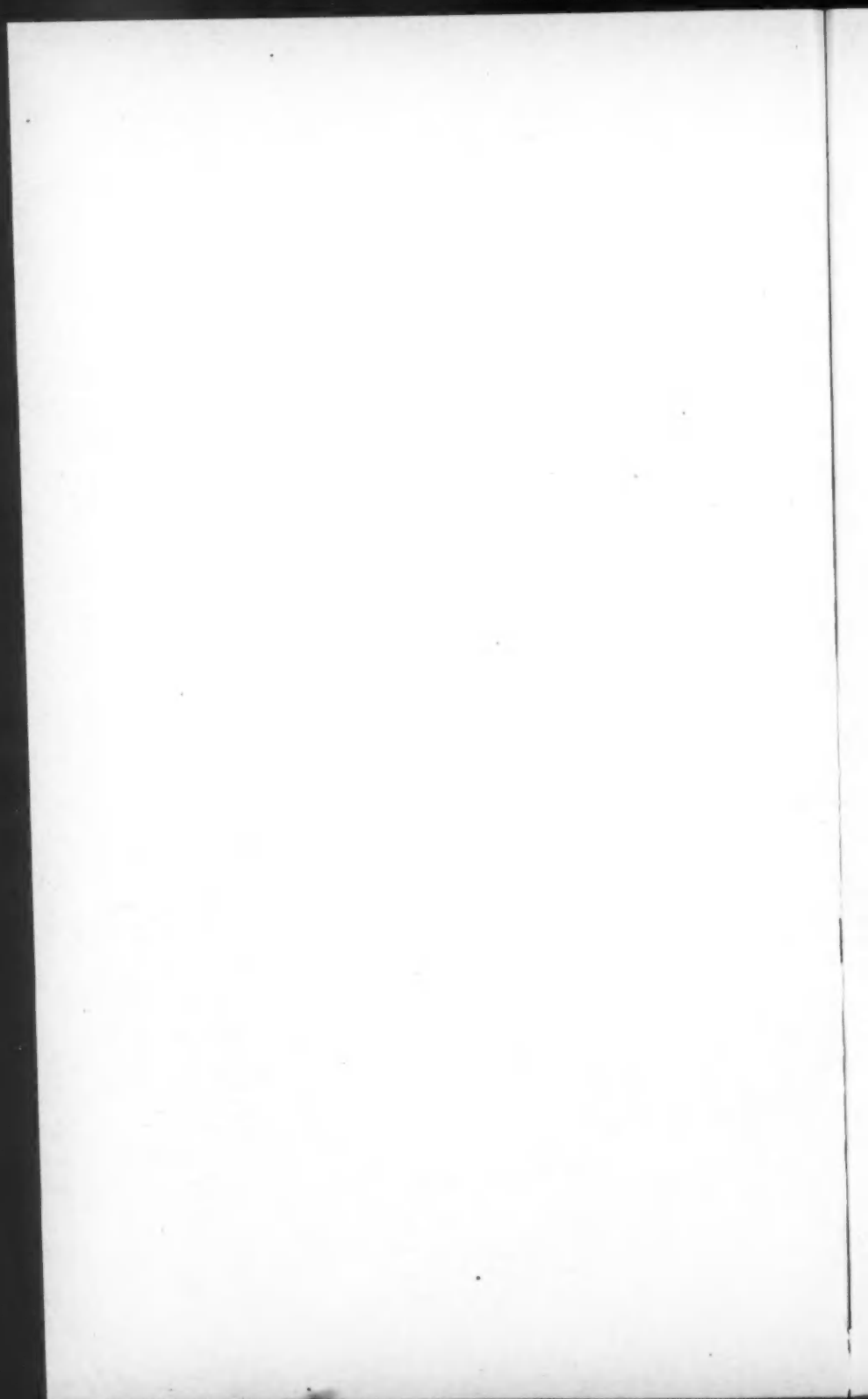
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HON. F. W. BULCOCK, MINISTER  
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1 JULY, 1940

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## **Farmers' Field Day, Mackay.**

**T**HE Annual Cane Farmers' Field Day was held at the Mackay Sugar Experiment Station on Saturday, 6th April, 1940. In fixing this date, which was much earlier than normal, it was hoped to afford delegates to the Conference of the Sugar Cane Technologists an opportunity of attending the function. The particular day coincided, unfortunately, with the period of the cyclonic storm which caused such extensive damage in the Lower Burdekin area; but despite the inclemency of the weather, a good and representative gathering of farmers was present. Due to the unfavourable conditions, the afternoon was devoted very largely to addresses by the Director, Assistant Director, Assistant Entomologist, and Mr. C. W. Thiele, growers' representative on the Advisory Board. The substance of the respective addresses is recorded below.

### **Address by the Director.**

It is my privilege and pleasure once again to welcome visitors to our station on the occasion of the Farmers' Field Day. These functions provide an annual opportunity for cane growers to meet one another and discuss their particular experiences and problems, in addition to their being able to see, discuss, and criticise the work we are undertaking here on their behalf; and, recognising the value of the occasion, I trust they will take full advantage of it. In voicing my welcome, I do not overlook that we have with us, also, representatives of the milling and commercial interests of the district; we would extend a very cordial reception to you gentlemen also, for your presence here to-day is ample proof of your recognition that the welfare of the district as a whole is synonymous with the welfare of the individual canegrower.

The Field Day is being held this year during the currency of the Annual Sugar Technologists' Conference. We realise that this necessitates our putting on the function a month or two earlier than normally, but it was felt that perhaps visiting technologists—both millers and growers—would be pleased of the opportunity to see and have explained to them what we are attempting in Mackay. I trust that you, also, may feel that the experience is worth while.

I am not quite sure whether it is discreet to offer the Mackay district my congratulations on its record crop production performance of 1939. The sugar tonnage produced amounted to some 210,000 tons, while the average yield of cane reached the flattering figure of  $18\frac{1}{2}$  tons per acre. While my complimentary remarks might be acceptable in such a year as 1939, I am extremely doubtful whether my sympathy would provide any solace in another such year when crop market quotas forced the farmer to leave a large proportion of his produce in the field.

However, as I have pointed out on many occasions the quantity of sugar produced is obtained by multiplying the average production per acre by the number of acres harvested. If we have any warnings to issue in respect of the difficulties which overproduction might bring in its train, we would counsel that you exert every effort to increase that tonnage per acre figure even further, and restrict yourselves on the acreage you cultivate or harvest.

Indeed, I would suggest that, although seasonal effects must not be overlooked, there is accumulating definite evidence that the standards of agriculture, and consequently intensity of production, are surely on the up grade in Mackay; and I have no hesitation in saying that this factor rather than any other has enabled the sugar producer to maintain his equilibrium in recent years, despite the steady fall in average sugar values which have characterised this period. I feel I cannot do better than to exhort you to redouble your efforts in this regard, in order that you may still further fortify yourselves against the uncertainties of the future.

I do not intend to repeat what I said yesterday when we met in Mackay for Farmers' Day at the Technologists' Conference. We are met here rather to see what progress we have made in the development of the principles I laid down there. First of all, we recognise that the production of a new cane variety which will outyield one of the older canes, while giving at least as high C.C.S., and above all, carrying high resistance to diseases, is one of the most potent means of reducing your production costs. For this reason we have made the cane-breeding campaign one of the most important projects in our programme. Each year some 6,000 new seedlings are grown on the Mackay station, and we hope in this way to be able to produce new varieties which possess the combination of all the features desired in a suitable cane for this district. We do not claim that we have been particularly successful to date, though we would again remind you that by far the best seedling we have propagated has had to be withheld because of its susceptibility to downy mildew disease. This in itself should impress farmers with the urgent necessity for getting and keeping the district free from this disease. On our station results, the cane in question (serial number C. 83) promised to outyield any other variety at present grown in the Mackay area.

One new seedling, Q. 20, has been added to the list of approved varieties for the Mackay mills this year, and a substantial tonnage will be available for wide distribution in the spring. While we do not claim any outstanding virtues for the cane, we would point out that it exhibits a satisfactory degree of disease resistance—notably to down mildew—it is rich in sugar, and may prove valuable as a cane for early cutting.



It does not possess particularly high growth vigour, but it seems to be a better ratooner than canes like Q. 813 and 1900 Seedling. We will now leave it in your hands, as farmers, to say whether, on your experience, the cane should be retained or discarded. This can only be determined by trial.

You will, later this afternoon, be afforded an opportunity to examine some of the more promising seedlings which have not as yet found their way into farm trials, and, of course, it would be unwise to attempt to predict their probable future at this juncture.

While endorsing your view that better varieties are the surest means of conferring a positive benefit on the canegrower, it is as well to point out that this is by no means the entire story. There is a limit to the soil fertility level, below which even the hardiest and most vigorous cane will not produce profitable returns. The farmer might therefore regard the distribution of a superior cane rather as a factor enabling him to derive an enhanced return from each acre cultivated, and contribute some of this increase towards a programme of soil improvement, which will enable the initial advantage to be consolidated.

I think you must in fairness agree that the area of land which we selected for the present Experiment Station is definitely not above the average of the Mackay cane lands in respect of quality. If you will not concede this, then we have failed in our choice; but I feel sure that a careful examination of several of our blocks will show that they suffer from the same defects of much of the second or third class areas—those of over wetness in times of heavy rainfall and droughtiness during rainless spells. We are attempting to adopt some of the methods which I outlined yesterday, whereby the productive capacity and physical qualities of the land may be improved, without the necessity for an impossible outlay in fertilizer purchases. We will discuss these methods again when we inspect our Block C, on which a rotational farming system is being followed. But I would say here, briefly, that the gospel of trash conservation and green manuring, combined with judicious fallowing under pasture, should be an unequivocal guide to success in this regard. Certainly some artificial manures must be purchased, in modest amounts, to make up those plantfood deficiencies which are overcome rather too slowly by fallowing alone: but even this need never become an insurmountable barrier. And it is well that farmers should remember, always, that the bigger the tonnage you harvest per acre, the greater is the drain on the plantfood reserves of the soil. The farmer who believes that a change of variety alone will put him out of his troubles is only deceiving himself, by robbing his land of its fertility at an accelerated rate, and hastening the time when the soil can no longer withstand the strain.

There is a matter which has come in for considerable attention during the past year, and to which I would like to make some reference at this juncture. I refer to the recent tightening up of disease control, through the agency of the 1938 amendment of the Sugar Experiment Stations Acts. It has been claimed in some quarters that the enforcement of the new Act is harsh, and has imposed undue hardship on many canegrowers; and that the Bureau is not administering the Act with that degree of sympathy or latitude which it is claimed might be expected.

I will agree that the methods of control thus introduced are rigorous. Experience has shown that they must be so. Our earlier, mild attempts to regulate varietal plantings under Cane Prices Awards proved entirely futile, for the reason that the parties concerned conveniently ignored their obligations. But it cannot be conceded that the charge of harshness in administration is just. Let us consider the major features of the regulations in question.

Firstly, we have the case of the farmer who continued to plant disapproved varieties, for which breach a substantial penalty had been in existence since 1934. Any farmer possessing such cane on the twenty-eighth day of October, 1938, would have been obliged, if the regulations were rigorously applied, to destroy all such cane immediately. It was recognised that this would lead to confusion and hardship when the number of offenders was appreciated, and representations were made to the Minister to have this waived for a period of one year, so as to enable crops of any variety whatsoever to be milled during 1939 without penalty. Surely this is evidence that due leniency has been extended, even to growers who were guilty of a breach of one act or another since 1934!

In order that there should be no misunderstanding, we issued, early in 1939, a brief and straightforward statement of the major features of the new legislation and posted a copy to every canegrower in the State. Special attention was drawn to the variety question, and, in addition, every grower was supplied with a card setting out the varieties which could be planted during 1939. It was clearly stated thereon that "the planting of any other variety for whatever purpose is prohibited." Surely these actions provided all growers with ample opportunity to straighten out variety difficulties, if such existed!

Now we are receiving applications for relief from growers who either failed to plough out their fields after they had harvested such canes in 1939, or who have planted non-approved varieties since they received their individual notifications of what canes could be planted. I feel certain you will agree that such instances do not call for special consideration.

There is another class of farmer who has conscientiously observed the approved variety lists, when planning his planting programme, but who now finds that such variety has since been removed from the list. The Act permits that farmer to harvest canes from such plantings during the three succeeding years—that is, plant, first, and second ratoons, if he harvests the field annually. Cases have arisen where a grower with third or even older ratoons might thus be forced to plough-out an undue proportion of his assigned area. Special provision was then made for such cases. The farmer was given the right to apply for relief under this section, if he could demonstrate that the strict enforcement of the Act would impose on him a material hardship. This seemed to us to be a very reasonable arrangement.

During the past year a large number of such applications reached our office; each was personally investigated as far as practicable, and in no case do we consider we refused the desired permit where a case for relief had been established. Of course, there were some—a minority, I might say—who did not get all they asked for, and some of these have

seen fit to publish their grievance far and wide, often without submitting all the relevant facts in the case. It is always as well, with matters of this nature, as with others, to review carefully both sides of the question before formulating one's judgment.

I would repeat here that the policy of granting relief in necessitous cases of this kind has been established, as a principle, by the Advisory Board; and it will apply in all areas where a limitation of approved varieties imposes such conditions at any time. I want to make this clear, so that any farmers who consider they can state a case in respect of the 1940 season may do so without delay, and learn where they stand in advance of the harvesting season.

There is, finally, the case of the farmer who is required, under the Act, to take certain direct steps in the elimination of disease from his fields. We have been compelled, during the past year, to issue a substantial number of eradication orders in this respect, so that the disease position may not be allowed to drift. The orders issued were of two kinds: the first, to meet those cases where the extent of the disease was substantial, requiring the farmer to plough out or otherwise destroy the block after harvesting the standing cane; the second, issued where the extent of disease infection was moderate, requiring the farmer to harvest the crop before a reasonably early date, so that adequate inspections might be made, and diseased stools eradicated from the young ratoons, well in advance of the wet season, when, as is well known, the spread of the disease becomes rapid.

Naturally, the farmer derived no pleasure from having to accept such an order; it often interfered with his ratooning plans, while, at other times, it necessitated harvesting immature cane. And I can assure you that we also experience no pleasure from serving such orders. But you all fully recognise that disease control is a communal and not an individual matter; plant diseases do not respect barbed wire fences—at least that is true of the one we are most interested in at present—and it becomes somebody's duty to take adequate control measures. Again, I would say, we have in no instance issued a "plough out" order where an "early harvest" order would fill the bill. Furthermore, the date for completion of the orders has been delayed as far as practicable, consistent with effectiveness. But it will be recognised that an "early harvest" order must necessarily be completed long before December; and in a few cases where farmers have chosen to delay the harvest, we have been obliged to substitute "plough out" orders for "harvest" orders. I would like it to be understood, however, that in no case have we required a farmer to destroy a mature crop of cane by ploughing out; such action is taken only after the cane has been harvested from the field.

And there remains just one point on which I would like to make a few remarks—that of compensation payable by the Disease Control Board to farmers required to destroy cane for the purpose of preventing the spread of disease. This provision was made in the Act with the express intention of encouraging any farmer discovering disease on his farm to make known its existence to the proper authority. If he thought that his zeal would be rewarded merely by the plough-out order, there would definitely exist an incentive to keep his information to himself,

and irreparable damage might be done before the disease were detected by an inspector. But it was never intended as a means of generally recouping a farmer for any loss incurred through ploughing out after harvesting, whether the presence of the disease arose through circumstances beyond his control or due to his own negligence. I would like to make this point clear, for I know that quite a lot has been said about the actions of your local Disease Control Board in this regard. Whether such a board agrees to compensate farmers in such cases or whether it decides to utilise its funds solely for the purposes of inspections and eradication of stools by its employees, is entirely the affair of the board. I am pleased to say that this, at least, is not a responsibility of the Bureau staff, for I appreciate the difficulties which would face any board adopting a general policy of compensation payments, irrespective of circumstances. At the same time, I do think that there will be cases where favourable consideration is demanded, and I am sure that no Board will shirk its responsibilities in this regard.

I trust you will pardon me for my plain, unvarnished statements in respect of the disease and varietal control action we have been obliged to take during the past year. I feel that we should understand one another and that you will place the correct construction on any of the measures we have had to adopt. At one of the recent Sugar Organisation Conferences one farmer delegate very wisely said that if the Act is to be administered simply on the basis of sympathy, we might logically wipe it out entirely. We do think it is to be interpreted with a full measure of understanding and appreciation of the difficulties it may involve; and we aim at all times to keep this aspect in its true perspective.

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#### Address by the Assistant Director.

On previous occasions of Field Day at this station the references to cane breeding have been of a rather general nature and we therefore thought that it might be of interest to farmers generally if we described in some detail the various methods of cane breeding used on our several experiment stations.

Cane breeding is now almost half a century old, the first seedlings having been produced in Java and the British West Indies early in the 1890's. As far as Queensland is concerned it is interesting to note that a few seedlings were raised at the Old Acclimatisation Gardens a year or two later, so that Queensland was possibly the third country in the world actually to raise cane varieties from seed. Nothing further was done in Queensland for about another ten years, when the Acclimatisation Society again became interested in the subject, and during the next few years a considerable number of seedlings were raised and tested. Of these the best known, and the only one which survives in commercial plantings to-day, is the variety Q.813, which still constitutes about 5 per cent. of the Mackay district crop. About the same period the C.S.R. Co. carried out a programme of seedling raising at their Hamble-don plantation: here originated the "H.Q." series, of which H.Q. 426 or Clark's Seedling is the best known.

In 1922 the raising of cane seedlings was commenced by the Bureau, on a small scale, at its South Johnstone Station; S.J. 2 and S.J. 4 are the best known of these early seedlings. Actually the late Director,

Mr. H. T. Easterby, had attempted to raise seedlings at the Mackay station some years previously but the attempt was unsuccessful—due to the fact that although cane arrows in the Mackay district, it does not set seed.

In order to raise seedling canes at Mackay it is therefore necessary to produce the seed further north, in the true wet tropics, and then transfer the seed to Mackay for germination. This practice was inaugurated in 1930, when an experimental batch of seed was brought down here from South Johnstone and germinated in specially heated boxes. In the meantime it should be noted that considerable advances had been made in the technique of cane breeding and we now knew how to preserve seed for short periods. The programme was steadily expanded and we now raise on this station some 6,000 or 7,000 seedlings annually.

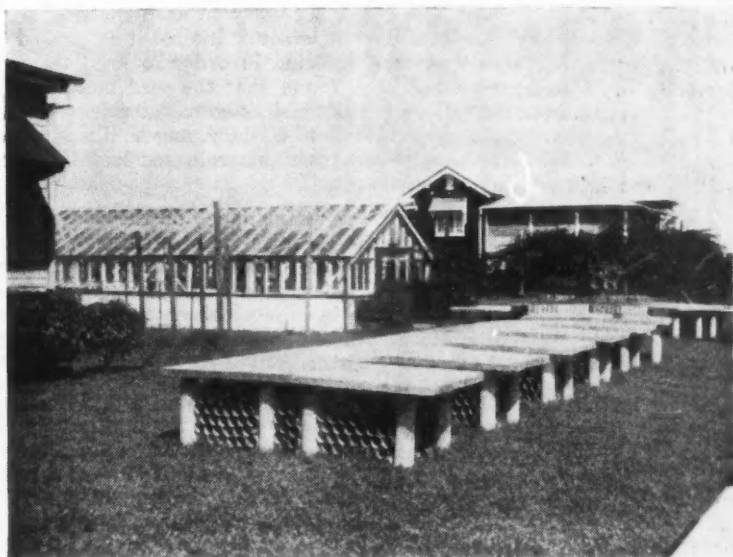


FIG. 1.—View of seedling tables and pots, with glasshouse in background, Mackay Station.

All cross-pollination work is carried out in the Cairns district, either at Meringa or at our arrowing grounds in the Freshwater area. Twenty years ago seedlings were what is known as field crosses—that is to say, arrows were just taken from the field and the fuzz planted in the hope that it would yield seedlings. In such cases, of course, only the female parent was known, and if a good-looking batch of seedlings was obtained it was consequently not possible to repeat the cross. It has since been found that arrows may be cut and taken from the field and kept in good condition for several weeks by standing them in a weak solution of a mixture of sulphurous and phosphoric acids. By this method we can place the arrows from any two varieties in isolated or well-screened locations, and so make sure that the resultant seed is the progeny of

these two varieties; if the seedlings should be a promising lot we can then repeat this exact cross the following year. (Of course, the process is not quite as simple as it sounds—varieties which it is desired to cross may not arrow at the same time, or neither may produce pollen, and so on.)

The arrows of both varieties are kept in close association until all pollen has been shed by the male parent, which is then removed and the female arrows are kept until they commence to fluff (by which time the seed is set). The ripened arrow is then picked and slowly dried in a current of heated air, and the fuzz is then ready for planting or storage.

Sugar-cane seed is very small, measuring only about one-sixteenth of an inch in length, while some 90,000 seeds go to the ounce (lettuce seeds run about 16,000 to the ounce). As a result we do not attempt to thresh them out but plant or store the mixture of seed, husks, and flower stalks which we call "fuzz." If it is necessary to keep the seed for a short period—as, say, for transport to other stations—it is packed in airtight bottles containing calcium chloride in order to keep the seed perfectly dry. Recently it has been found that the seed may be kept in good condition for fairly long periods if it is stored at a temperature a few degrees above freezing point. Indeed, the young seedlings which you see here to-day have been grown from fuzz collected last June and since stored in a chilling-room.

Germination of the seed and the maintenance of the very young seedlings present some difficulties and require close attention. As you see, the seedlings are germinated in small boxes or "flats" which are filled with a mixture of sand and well-rotted compost. In order to avoid loss of seedlings by root fungus attack, it is necessary to sterilize this mixture before use, and accordingly after the flats have been filled both flat and soil mixture are sterilized with steam.

The flats are then transferred to the hot-house and a thin layer of fuzz is then spread over the surface, moistened, and lightly tamped down. The temperature of the hot-house is held as far as possible at something over 70 degrees Fahrenheit during the night and allowed to warm up during the day; the flat is kept moist by frequent spraying and is covered with a sheet of glass. The fuzz germinates after some three or four days; the young seedlings are very delicate, and for the next few days require a very high humidity combined with a moderate temperature. In appearance, as you will see, they resemble an ordinary grass seedling; in fact, in our first efforts at seedling raising in Mackay we very carefully nursed some tiny seedlings which later turned out to be couch grass.

After about four to six weeks' growth in the flats the seedlings are transplanted individually into pots and there grown for another four to six weeks before being transplanted into the field. These pots are nothing more than short lengths of galvanised-iron down-piping, and when the seedling is transplanted into the field the core of soil and roots is pushed out of the pot intact; as a result the transplanting does not give the young plant a setback.

The potted seedlings usually go into the field in October. At this time they are about a foot high and look a long way behind the adjacent fields of ordinary cane planted from cuttings the previous May or July.



However, the subsequent growth of the seedlings is very rapid and, although the stools are planted 3 feet apart, by the following July they have produced a more or less mature crop, which will nearly always outweigh any nearby crop of twelve or fourteen months old cane. The stooling of original seedlings is very good and is always much better than cane grown under similar conditions but arising from the planting of cuttings.

Every seedling produced in this way is actually a new and distinct variety, and our field of 1939 seedlings now contains some 6,000 new varieties, none of which has ever been grown before. Many of them are obviously useless and can be discarded on sight, but the selection of the possibly valuable new seedling presents a difficult problem. Careful inspections are made at intervals and, finally, about seventy-five are selected on the basis of their appearance. No doubt, we sometimes throw away good seedlings, but if we have one outstandingly good seedling in each year's batch we should be doing very well, and we feel that by selecting seventy-five we are bound to include that very good seedling—if it exists.

You have, if you wish, an opportunity of examining original seedlings in the field immediately behind us. These are planted out in families, and you may see that there is often a distinct family likeness apparent among the seedlings of any one cross; on the other hand, you will also see that there is a very wide range of variation in the vigour of full brothers and sisters.

The selected seventy-five one-year-old seedlings are now planted out in early spring, and our practice is to plant them in forty-stool plots of four rows of ten setts each. In other countries there is usually planted in the second year a single row of six to ten setts, but we claim that the four rows enable us to obtain an early insight into such qualities as coverage—a very important factor in a country of high wages. These forty-stool plots are given ordinary field treatment, but are inspected frequently and notes taken as to their various growth characteristics, while sugar tests are also made.

At the end of a further twelve months (that is, two years from the germination of the original seed) a further selection is made, and this time about fifteen varieties are selected from the seventy-five second-year seedlings. The selected fifteen are then planted out in plots about one-twentieth of an acre in area, while dotted throughout the field are similar-sized plots of a well-known standard cane, such as 1900 Seedling, so that comparative observations can be made.

At the end of another year the selection process is repeated again, and this time about four seedlings are selected, and these go into replicated trials both on this station and on farms, and from these trials, both plant and ratoon, are selected those seedlings which are given a Q. number and distributed for general trial on farms. In the meantime, disease-resistance trials have been conducted, and those seedlings which carry too high a degree of susceptibility to any one disease are withdrawn from circulation.

It will be seen that about five years elapse between the germination of the original tiny seed and the stage when seedlings can go out for early farm trial, and two or three more years must then elapse before

it can be judged whether the variety can stand up to general conditions of commercial plantings in all types of season.

Assuming equal conditions, the original seedling is always more vigorous than it is in the second or subsequent years of growth, and the vigour of some seedlings appears to fall off gradually for the first two or three years. It is quite a common thing to select a seedling which looks a "world-beater" as an original seedling but which looks rather horrible in the second year of growth. We also often select varieties which show excellent growth for three or four years and then have to be discarded because they fail to ratoon or prove unduly susceptible to some disease. We mention these factors to show that cane breeding is full of disappointments, and one should never become unduly optimistic about any new seedling until it has had several years test.

In so far as Mackay climatic and soil conditions are concerned it is our very definite experience that the best type of seedling is one which contains a proportion of "wild" blood, as introduced by the use of P.O.J. 2878, or one of its brothers or sisters, as one of the parents. The incorporation of a strain of this wild blood gives a strong rooting system, vigorous growth, erect habit, and the ability to ratoon strongly under adverse conditions. These characters are all very desirable under Mackay conditions and must be possessed by any cane which is to replace the existing standard varieties.

Unfortunately, at the same time as they impart these desirable characters to their progeny, the P.O.J. canes also transmit a greater or less degree of susceptibility to downy mildew disease. This is the block on which we have stumbled to date and is the reason why our cane-breeding programme in Mackay has not produced more results. As Dr. Kerr has pointed out, possibly the best seedling we have ever raised, namely C. 83, has had to be placed in cold storage on account of its susceptibility to downy mildew disease. This variety, the genealogy of which you see represented on this chart, is the product of a cross between P.O.J. 2878 and S.C. 12/4. Grown on this station over a period of three years it averaged, for plant, first, and second ratoons, 36 tons of cane per acre with an average C.C.S. of slightly over 16; in the same trial Q. 813 averaged 26 tons of cane at about the same C.C.S.

As I say, this variety showed the same order of susceptibility to downy mildew as does P.O.J. 2878, and I do not think that there are many among you who would now claim that under present downy mildew conditions P.O.J. 2878 could continue to be grown in this district. Under such circumstances it would be foolish to try to propagate C. 83.

You will see that we have been more or less confronted with a brick wall—we cannot make appreciable varietal advances without using seedlings with wild blood, and we cannot propagate many of this type of seedling in the face of the present distribution of downy mildew. It was to deal with this impasse that we have (a) prohibited the growth of P.O.J. 2878 in most of the Mackay area, and (b) constituted a Disease Control Board. We confidently expect that the elimination of P.O.J. 2878 2714, and 213 and a continued energetic programme of inspections on the part of the board's inspectors will see downy mildew almost eliminated in a year or two. At that time it should be safe to return to somewhat disease susceptible varieties—provided, of course, that the Disease Control Board continues to keep a close watch on all farms and so will be in a position to nip any disease outbreak in the bud.



So far the only variety it has been possible to release from the Mackay station has been Q. 20; this is not an outstanding cane but its fairly strong ratooning and downy mildew resistance may warrant its planting. This year we will put out on farm trials another Mackay raised seedling, Q. 28, obtained from the cross Co. 290 x Q. 1098. This seedling appears quite vigorous and you may see ratoons of it in front of the laboratory; as its parentage suggests it does not appear particularly high in sugar. In the plant crop of the trial just referred to it yielded  $41\frac{1}{2}$  tons per acre at  $14\frac{1}{2}$  C.C.S. as compared with 30 tons at  $16\frac{1}{2}$  C.C.S. for Q. 813; it must be remembered, of course, that this is good Q. 813 land.

Two other seedlings, Jason and Comus, may also be tested on farms this year. Both are resistant to downy mildew, but Comus may prove susceptible to mosaic, while Jason has the drawbacks of free arrowing and a very heavy growth of long stiff hairs on the leaf sheath; it is not a variety likely to be popular with farm labour. Both of these varieties were bred by the C.S.R. Company.

In conclusion, we trust that the downy mildew disease situation will very rapidly improve to the point where we will not have to be so exacting regarding the downy mildew resistance of our seedlings.

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#### Address by the Assistant Entomologist.

Mr. McDougall said that on Friday at the agricultural session of the Queensland Society of Sugar Cane Technologists grub control in the Mackay area was discussed at length by several farmers who attended, and others. It had been known for some months, he added, that in the present year grey-back grub damage was not likely to be either widespread or severe, provided weather conditions in the May and June period were at all reasonable. Unfortunately, the same could not be said of wire worms. Last year many poor, irregular, slow, or patchy strikes were experienced in the Mackay district, and of these only a very small percentage could be attributed to the effects of pests. However, it was anticipated in the present year, following the protracted summer rains, that wire worms would be a serious problem to many farmers. Such a state of affairs was going to force a considerable amount of very late planting and supplying throughout the district. The method of trial setts in vogue for a number of years for finding out, prior to planting, if wire worms were likely to do much damage, could be improved upon, but was not likely to advance very far. It was, however, not in general use in the Mackay district. Most farmers would rather plant early, and when their crop had been damaged, supply the misses in partly damaged blocks, which procedure might be economically sound. When the fields were shown by the planting of trial setts to be badly infested some attempt should be made to conserve soil moisture, and plant late. At present, although badly needed, they had not a variety of cane entirely suitable for the October planting. Such a variety should show at least rapid early growth. It should cover in quickly and well, and should be able to stand "wet feet" to a considerable extent. To date, E. 28, although by no means ideal, apparently gave the best plant crop results on most wire worm country if it had to be planted in early October. It was, of course, not a good ratooner.

Mr. McDougall went on to deal with the problem of the control of rats, stating that during harvesting seasons for some years damage by rodents had caused concern to farmers in certain areas. To lessen this, the planting of hard-rinded, thick-barrelled, non-lodging varieties in rat-infested country was recommended; also the use of phosphorus paste on bread. In this connection he detailed the method of placing the baits, also pointing out that the phosphorus-bread bait was the most deadly rat poison known and that its effectiveness should never be judged by the number taken in the field. On occasions, however, baits would not satisfactorily control rats in cane. In such circumstances damage was likely to be widespread and would not be overcome by farmers themselves trying a change of bait. Further authoritative advice should be sought. The provision of rat baits, or poison, was a matter which could best be carried out by the local Pests Board or other growers' organisation.

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**Address by Mr. C. W. Thiele, Advisory Board Member.**

Mr. Thiele, Chairman of the Bundaberg District Executive and growers' representative on the Sugar Experiment Stations Advisory Board, said he was not a stranger to most of those present. He added that the officers of the Sugar Experiment Stations went to a lot of trouble to provide something interesting for farmers to see at such field days, and it was most disappointing when those concerned did not come along and see for themselves the work that was being done. They had that day had the experts' side of sugar growing placed before them. Mr. Thiele added that he was not an expert, but just an ordinary farmer. He had, however, been placed in the position that many of them had also found themselves, of seeking something to supplement their income. As a practical man with practical sons, he had been able to do something to ease the position to a great extent, even on inferior land, which was returning almost as much as he had been getting on double the area of good land assigned to cane. They would only be able to harvest about half their crops with the advent of the farm peaks, and those present might also have to face that position.

During the last few days, he said, they had the members of the Port Curtis board of directors meeting in Mackay, and a lot had been said about the extension of dairying in the Mackay district. He fully realised that its potentialities were great. They had dairying land without going over the range equal to anything in Australia. However, he would not like to advocate or suggest that they should go into dairying on a large scale at present. The position overseas, with regard to dairying, had very little improved, as far as he could see, and that industry would be very fortunate if it was not in the same position as that of sugar in the next few years. The situation was becoming very acute and the high price of butter was forcing people to use margarine at 10d. a lb., as against butter at 1s. 7d. However, no matter what might be done in the way of dealing with margarine, there could be no substitute for butter. When the war was over, he added, he did not think the unlimited market they hitherto had experienced would prevail.

There was another form of agriculture which could be undertaken successfully, and was one of the few lines in which there was no over-production, and for which there would be an unlimited market in

England for a long period—that was pork and bacon. Some other countries, particularly Poland, had been a very large exporter to England, but it would be years before the latter would send any more. The present, therefore, was the time for Queensland and Australia to endeavour to build up trade with England that would be of great value. Quite a large volume of pigs could be handled in Mackay on a comparatively small area of land. Horse and cattle breeding involved considerable expenditure, but a start could be made with pigs on a very small scale. Their prolific breeding qualities would enable farmers in the course of a year or two to produce pigs which would return a good income.

Mr. Thiele added that he and his sons were handling 600 or 700 pigs on 20 acres of poor land. Of course, that had to be supplemented with an area for growing sweet potatoes and sorghum. The Department of Agriculture was experimenting with sorghum and excellent promise was given that the crop could almost be doubled. Root crops also could be put in and in addition they had molasses. Some time ago people thought they could grow pigs on molasses and water, but that was not so. Molasses, however, could be given to a pig provided the ration was balanced. A full-grown pig would not require more than from 2 lb. to 3 lb. of molasses a head per day without detriment to the bacon. Sweet potatoes could be grown and the pigs would harvest for themselves, and with a small quantity of grain bacon could be produced at low cost. An experienced and efficient pig breeder could tell them to a fraction how many pence it took to produce a pound of pork.

Mr. Thiele said that the electric fence could hardly be done without to-day. Such fences were effective in respect of any class of animal. Plots should be laid out in wide strips which could be electrically fenced at very little cost. Pigs could not get through it and nothing else would; also the concreting of floors was done away with. Small moveable sheds could be built—say, half-a-dozen. The pig was a grazing animal and digging through the paddocks would sub-soil them. Mr. Thiele recommended those thinking of taking up pig-raising not to go into it in a big way, but to start with two or three. They could easily strike trouble if they had a lot, but if they handled one or two litters proper attention could be given. They should also be careful to see that the ration was balanced. It was hardly necessary even to have milk, but milk did help young pigs. It was necessary to select the right class of pig. A big animal, not a fat one, was required for export, and in this connection he recommended a good long type, which was the sort wanted in England.

Mr. Thiele concluded by saying that if anyone present desired any further information which it was in his power to give, he would be only too pleased to furnish it.

#### **Brief Inspection of Station Fields.**

Following the addresses, those present made a brief tour of inspection of the fields in the neighbourhood of the laboratory building. Keen interest was shown in the more advanced seedling canes which were undergoing yield trials in these blocks, while farmers were also very interested in the plots of new legume species which were being tested.

### Ploughing-in Trash.

A few years ago, canegrowers experienced considerable difficulty in ploughing-in trash. These have now been very largely overcome, as the essentials of a good "trash" plough became appreciated. An expedient commonly adopted to assist in the job is the fitting of a piece of spring steel to the plough in such a manner as to compress the trash just ahead of the point of contact of the disc.

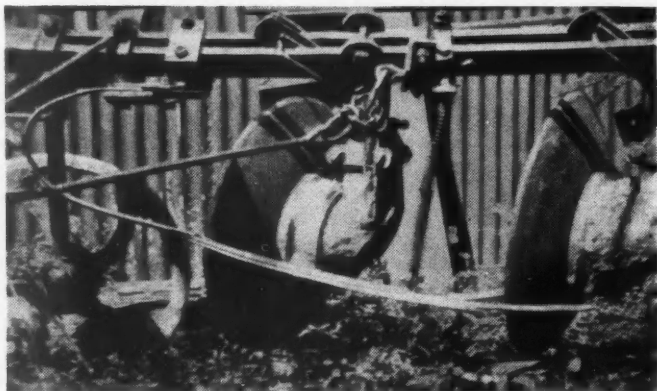


FIG. 2.—Showing spring steel attachment used when ploughing-in trash.

The attached photographs (Figs. 2 and 3), which were taken on a farm in the Cairns district recently, show how this device has been fitted to a two-disc plough.

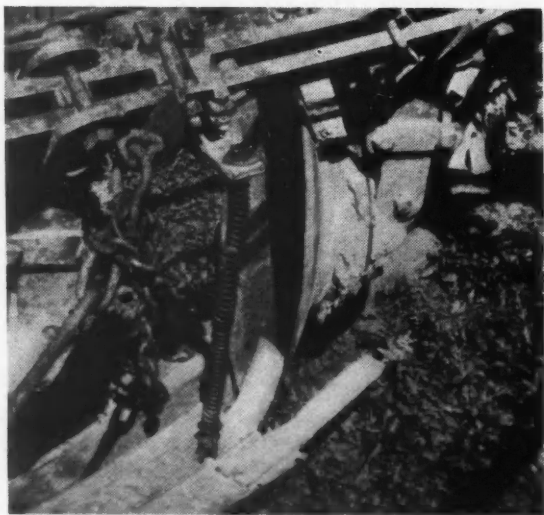


FIG. 3.—Close-up view, showing the shape of the spring.

It will be observed that the rear disc only has been supplied with the spring, which is forked at its lower end, thus compressing the trash on both sides of the disc. It is always advisable, of course, to keep the disc edge keen: this may readily be accomplished by employing the disc sharpening unit described by D. L. McBryde in the Quarterly Bulletin for July, 1939.

H.W.K.

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### Pneumatic Tractor Tyres.

During recent years the use of rubber tyres for tractors as well as farm implements and vehicles has made marked advances, and in Queensland to-day many new units are purchased with this equipment. In overseas countries they have been even more extensively applied, and cane growers will doubtless be interested in a review of a Bulletin recently issued in Iowa, United States of America, which sets out to summarise performances of some 200 tractors fitted with pneumatic tyres. These had been in use for periods up to five years, and were operated for a number of purposes under a variety of conditions.

Considerable variation existed in the rate of tyre wear; avoiding excess slippage was stressed in order to assure a long service. The estimated useful life varied from three to fifteen years, with an average of seven; in terms of hours of service, this amounted to 6,765.

Estimated fuel savings, in comparison with steel wheels, averaged 22 per cent.; the estimated saving in labour was 23 per cent. Fifty-four per cent. of the farmers reported the use of a higher gear for most operations.

The new high lug treads were reported as being generally more satisfactory, particularly for adverse traction conditions. The use of water to increase the wheel weight was found generally satisfactory.

The main advantages claimed by users were: Reduced fuel and labour requirements; higher speeds; easier operation on hard-surfaced roads, meadows, and pastures; decreased tractor breakage and wear, and greater comfort.

The chief disadvantages were: Higher first cost; possibility of delay and expense from accidental damage; the expense of equipping at least part of the drawn equipment with rubber tyres; lower maximum draw-bar pull under many conditions; excessive bouncing under certain conditions; more objectionable tracks in loose tilled soil, and decreased stability for belt work.

The most effective use of a rubber-tyred tractor requires the highest practicable speed, the widest implement which can be pulled satisfactorily by the engine and tyres at this speed, and enough wheel weight to provide effective traction.

Over 98 per cent. of users were satisfied with the performance of rubber tyres, and most were agreed that they showed satisfactory durability and field performance.

H.W.K.

### **Non-approved Varieties.**

Growers are advised that they must not deliver or attempt to deliver to their mill, during 1940, canes from any variety which was not approved at the time of planting.

This rule has been enforced rigorously in all areas of the State, and farmers were fully informed during 1939 that, while any variety could be delivered for crushing in that year, no exceptions would be entertained for future years.

It should be added that not only is the farmer liable for a heavy fine if he attempts to do this, but the mill can be fined £500 for accepting such canes.

Fields which have been declared by the Director of Sugar Experimental Stations to be "Experimental varieties" are, of course, exempted from this provision; but in all such cases the farmers concerned have been given written authority for the growing of such cane, while a list of fields in question has also been supplied to the mill.

H.W.K.

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### **Grain Sorghums are Downy Mildew Resistant.**

The exigencies of disease control work have compelled the control of maize plantings in the Bundaberg area. The high susceptibility of maize to sugar-cane downy mildew is now well known by all growers who have had experience with this serious disease. It must be recognised, however, that in this district cane is the major crop and maize the minor one, and it would be foolhardy to continue paying levies to the Disease Control Board for the eradication of downy mildew in cane, while wholesale plantings of the more susceptible maize were still allowed in diseased areas.

The question of replacement of maize by a more suitable fodder and grain crop arises, and the possible answer appears to be in grain sorghums. The growth of grain sorghums is in its infancy in this district, but the varieties so far tried have distinct promise. It is suggested that growers endeavour to obtain small supplies of seed for an early spring planting. The varieties differ in type; some are leafy and are more suitable as green fodder, whereas others are less leafy and are best for grain production. They are very heavy grain producers, and their principal value over a maize crop lies in the fact that they will ratoon. The grain is—in the best types—about three sixteenths of an inch in diameter and is round. American literature states that the feeding value is very little below that of maize.

The grain sorghums we have tested so far are highly resistant to downy mildew—in fact, no symptoms of the disease have been discovered in them at all, although subjected to heavy infection from surrounding diseased cane.

The grain is easily separated from the heads by means of a peg drum. During the wet months of this year a crop of grain sorghums on the experiment station was badly affected by peach moth after coming into head. Earlier plantings will be made this year to see whether the attack will be escaped by controlling the time of planting.



It is anticipated that supplies of seed of four or five of the most suitable varieties for the area will be available in the coming spring. Interested farmers should communicate with the Director of Agriculture, Department of Agriculture, Brisbane, at that time.

N.J.K.

## Important Notice to Bundaberg Cane Growers.

### Control of Maize Plantings.

CANE growers who have interested themselves in the control of downy mildew disease will have been impressed by the rapid manner in which fields of maize grown in proximity to blocks of susceptible and infested cane varieties have contracted the disease. Moreover, such diseased maize fields serve as centres of infection from which the cane is still further bombarded with spores.

It can safely be claimed that much of the good work of the Disease Control Board has been negated by the thoughtless action of some farmers who persist in the planting of maize, despite the knowledge that their farms carry downy mildew disease. Not only does this result in the unnecessary expense of roguing which the Board incurs, but the grower in question will probably gain nothing from the maize crop, and stands an excellent chance of earning an eradication order for his diseased cane.

The seriousness of this complication was placed before the Minister for Agriculture, who agreed to the gazettal of Proclamations under the Diseases in Plants Acts, whereby maize plantings may be adequately controlled. These Proclamations are now in force, and their requirements should be carefully noted by all Bundaberg cane growers. **The area comprising all lands within the Gin Gin, Bingera, Fairymead, Millaquin and Qunaba mill areas is embraced, with the exception of those farms lying to the north of Yandaran Creek.**

The control measure to be imposed is that no farmer shall plant maize within the prescribed area unless permission in writing for such planting shall have been first granted by the Minister or an Inspector.

Henceforth, farmers wishing to plant maize should apply forthwith to the Officer in Charge, Sugar Experiment Station, Bundaberg, or to the Secretary of the Cane Disease Control Board at that centre. It is not intended to refuse permission to any farmer where it is considered that no danger of disease spread would be incurred. But it is useless for any farmer who knows his cane to be infected with downy mildew disease to make an application.

A further condition which will be imposed before permission is granted is that the maize seed shall be obtained from a reliable source. In order to facilitate such supplies, arrangements will be made for certified seed to be offered for sale, and the details of this will probably be handled by the Bundaberg District Cane Growers' Executive.

H.W.K.

### Mixed Seedings of Green Manures.

While Poona pea has become highly regarded as a green manure species in practically all cane districts, it is appreciated that its early maturing character is a handicap in the wetter areas of the State. Under these conditions many farmers are successfully using a mixture of Poona pea seed with giant cowpea to overcome the drawback. Two bushels of giant cowpea with one bushel of Poona pea provides a satisfactory mixture. The Poona pea gives a rapid early cover and controls weeds; while the prolonged growth period of the giant pea enables the farmer to turn under a good mass of green matter towards the end of the wet season.

It should be noted that if a Poona pea crop perishes after it has made its growth, but before it can be ploughed under, not all of the benefits of the crop are lost, as many farmers suppose. The supply of nitrogen which it has accumulated still remains in the dead leaf and stems, or is washed into the soil by the rain after the death of the plants. Unquestionably, best results will follow where it is possible to turn the crop under at the height of its succulent growth.

H.W.K.

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### Non-Approval of S.J. 4 in the Hambledon Area.

By H. W. KERR.

**D**UE to the discovery of the widespread occurrence of gumming disease in the Hambledon area, the highly susceptible variety S.J. 4 was eliminated from the list of varieties approved for planting during 1940, except in that portion of the district south of Blackfellow Creek. Clark's Seedling, which is also susceptible to the disease, but which had ceased to be a major variety in recent years, was eliminated from plantings in the entire Hambledon district.

It is appreciated that S.J. 4 has become the leading variety in the district, and it constituted over 39 per cent. of the crop harvested in 1939. For this reason, growers will be hard pressed to obtain suitable planting material of approved varieties this year, but the local mill officers, assisted in some degree by the Bureau, are doing all possible to alleviate the position. At the same time, growers are reminded that section 14 of the Sugar Experiment Stations Acts becomes operative in respect of both Clark's Seedling and S.J. 4. This section requires that canes of any variety approved when planted, but subsequently removed from the list, may be harvested only during the three calendar years following the year of planting; the field must then be ploughed out. It provides, however, that canes of such variety *growing* at the time of non-approval may be harvested in that year.

The position then is:

(1) Canes of these varieties planted in 1939 may be harvested during 1940, 1941, and 1942, but **not** during 1943 or subsequent years.



(2) Canes of these varieties now first ratoon may be harvested during 1940 and 1941, but **not** during 1942 or subsequent years.

(3) Canes of these varieties now second or older ratoons may be harvested during 1940, but **not during 1941 or subsequent years.**

The rigorous enforcement of this section would doubtless cause confusion in many cases where farmers have planted S.J.4 almost exclusively, and particularly where third or older ratoons are grown. In such cases, the Act requires **all fields now second ratoon or older** to be destroyed after the 1940 harvest.

The Director referred this matter to the Sugar Experiment Stations Advisory Board at its March meeting and the Board agreed that relief from this section of the Act should be granted in those cases where its strict enforcement would impose a material hardship on the grower; provided always, of course, that the disease position is not worsened by this action.

This decision was conveyed to the Secretary of the Hambledon Mill Suppliers' Committee, with a request that each grower desiring to apply for some exemption from the section should submit a fully detailed application as early as possible, and for preference, in advance of the harvesting season. If any grower has not already done so, he should get in touch with the Secretary, and prepare his application without delay. Such application should include:—

- (1) Name and address of farmer.
- (2) Portion number and parish, gross and net assignment.
- (3) Particulars of **all** fields on the farm before harvesting commences in 1940—i.e., fallow, plant, first ratoon, second ratoon, etc., giving the area of each block, the year of planting, and the variety in each case.
- (4) A statement in support of the claim that hardship would be imposed by the incidence of section 14.

It should be stressed that the number of years after the year of planting in which such variety may be harvested may be modified in respect of any field which becomes so diseased as to require its destruction as a disease control measure.

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### **The Use of Sorghum Instead of Maize in Mixed Green Manure Plantings.**

Many farmers adopt the practice of broadcasting a mixture of maize and pea or bean seeds on fallow fields, for the purpose of providing conditions more suitable for the development of the legume crop.

In areas where downy mildew disease exists, this practice is to be strongly deprecated. If the farmer wishes to provide a species which will serve as a support for the peas or beans, sorghum is equally suitable for the purpose: as sorghums are much more highly resistant to the disease, the dangers of infecting nearby fields of susceptible canes is virtually eliminated.

H.W.K.

### **Distribution of Q. 25 in the Bundaberg Area.**

During the spring of 1940 a large quantity of variety Q. 25 will be distributed for plantings in the Bundaberg district. Farmers should note that this variety is not approved for general planting in any of the Bundaberg mill areas, and every such planting made this year must be duly authorised; any farmer growing the cane on his farm without the approval of the Bureau of Sugar Experiment Stations renders himself liable for trouble, which will include the ploughing out and destruction of the field of the variety.

All Q. 25 planted must be obtained through the Bundaberg Cane Disease Control Board, and applications for the cane were duly advertised in the local press. This warning applies equally to growers now in possession of Q. 25 propagation plots, under agreement with the Bureau, as well as to their friends and neighbours who may wish to obtain plants therefrom through any but the authorised channels.

H.W.K.

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### **Army Worms Attacking Flood-Damaged Cane.**

**D**URING the wet season in the North, most of the swiftly running coastal streams flood and overflow their banks, and for some time afterwards it is not unusual to find water lying in certain of the depressions on farms adjacent to these rivers. Should these depressions occur in fields that have been planted to cane, then the crop is usually killed or severely checked, and often one can see cane in such places in various stages of damage ranging from stunted dead cane in the lower parts to more normal cane where the higher ground is reached.

This damaged cane and the cane adjacent to it is often the scene of an army worm attack at some later period, and the attack is generally sufficiently severe as to become quite noticeable from some distance off as the midribs stand out stiff and denuded of most of their leaf blades. The accompanying photograph (Fig. 4) illustrates the manner in which a forward crop of Pompey growing on a flood damaged farm in the Barron Valley was later affected by army worm attack.

These army worms are the caterpillars or larval stages of a species of night flying moth which is almost cosmopolitan in its distribution. The moths are greyish in colouration, quite inconspicuous, and they seem to prefer to lay their eggs in places where there is an abundance of decomposing trash, debris, or similar material. No doubt the quickly dying leaves on the affected stools induce the moths to congregate there and lay their eggs, and the resulting caterpillars on hatching out commence to feed on any of the remaining green leaves. As the caterpillars increase in size, their appetites become more voracious, and when their numbers are large it is not difficult to understand how they account for such damage to the leaf tissues as is depicted in the photograph.

The majority of growers are more familiar with army worms attacking young ratoon cane in the spring or early summer months, but attacks similar to that described above often follow the wet season rains.

A highly unusual but somewhat similar army worm attack was seen in the late autumn of 1938 on farms in the Little Mulgrave area, but in this case a heavy hailstorm was experienced in April of that year, and it was the indirect cause of the visitation. Some of the fields were badly damaged by the hail, and the cane leaves were almost entirely stripped. This resulted in a considerable amount of broken and torn leaves dying around the cane sticks, and this apparently attracted moths to lay their eggs there. Later on, as the cane commenced to recover and put forth new leaves, these leaves were just as quickly eaten by the army worms.



FIG. 4.—Showing how a crop of flood-affected Pompey was damaged by army worms.

Actually these outbreaks in older cane are more spectacular than harmful, and they usually do not call for any special control measures being instituted against the pest. In most cases numerous fly and wasp parasites take toll of the caterpillars, whilst the succeeding winter months slow up the development of any that may have escaped the combined activities of their natural enemies, and the populations soon revert to normal once more. Therefore, looked at in their true perspective, these late season outbreaks should not cause the grower undue concern, and are not in the same category as outbreaks in young ratoons, where baiting must sometimes be resorted to before the pest is eventually controlled.

R. W. M.

### Sampling Soils for Analysis.

Canegrowers are reminded that between July and October is the correct time at which to sample their soils for analytical purposes. As pointed out in the October, 1938, Bulletin, analytical results and advice based thereon are most valuable when soil sampling is confined each year to **blocks carrying mature crops of plant cane**. All samples should be truly representative of the soil of the block; portions should, therefore, be taken at several locations, to plough depth, and carefully mixed to give one sample for the entire field.

Should the farmer desire it, the local Field Officer of the Bureau will be pleased to call, on request, and attend to the taking of the sample and its despatch to our laboratory. Alternatively, the farmer should send the parcel of soil which he has taken to—

The Director,  
Bureau of Sugar Experiment Stations,  
Department of Agriculture,  
Brisbane,

being careful that his name is included as well as identification marks if more than one sample is despatched.

Farmers in areas north of Townsville may despatch their samples to the Sugar Experiment Station, Gordonvale, where they will receive prompt attention.

H.W.K.

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### Fumigation for the Control of Cane Grubs.\*

By W. A. McDOUGALL.

**I**N this lecture it is proposed to deal with the phases of pest control covered by the subject "Fumigation of Cane Grubs," with particular reference to the Mackay district. Before delving too deeply it would be as well to demonstrate some elementary points in connection with grubs, an understanding of which is necessary for those who would follow later discussions.

As is well known, beetles lay eggs, from which, in due course, small grubs hatch. These grubs do not increase in size gradually, but make a certain number of rapid but definitely spaced changes. Cane grubs with two such changes may therefore be found in three distinct sizes called first, second, and third stages. Grubs in each of these stages not only vary in size, but exhibit different behaviour so far as their distribution in the soil and damage to cane are concerned. Moreover, each stage of a particular species of grub exhibits its own specific body markings.

#### Identification of Grubs.

Of all the numerous kinds or species of grubs which are found in soil, or for that matter, even amongst the roots of cane, two only are of direct importance to the cane farmer—namely, the "grey-back" grub and the "frenchi" grub. The beetles of these grubs are fairly well

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\* Address to Q.S.S.C. Technologists at Mackay Conference, 1940.

known: the larger grey-back beetle may be collected in numbers from fig trees, Moreton Bay ashes, and other feeding trees, while the smaller brown "frenchi" beetle is sometimes seen hanging on fences, &c. On the other hand, the average farmer often makes little effort to find out which grub is damaging his cane. However, with the advent of fumigation to this district, it is necessary, as will be gathered from later remarks, for all concerned to know the species of grub with which they may have to deal, and also something of the various grub stages. These two cane grubs are distinguished from one another, and from other ground grubs, by the arrangement of hairs on their lower posterior ends. All grey-back grub stages show two parallel rows of small hairs, whereas the frenchi grubs exhibit a pear-shaped arrangement of hairs. (Fig. 5).

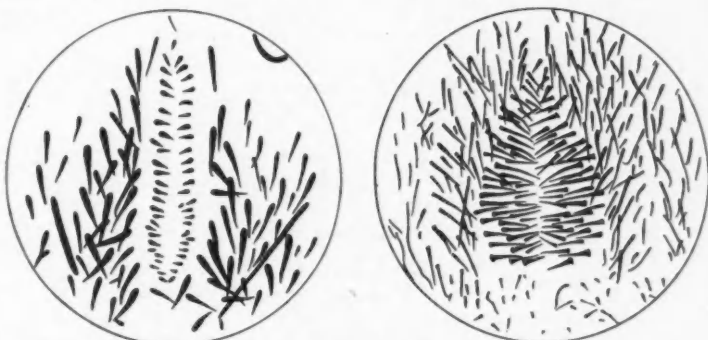


FIG. 5.—The two important cane grubs, in all stages, may be identified by the arrangement of "hairs" on the underneath surface of the last body segments. This is illustrated (above) for the "greyback" (left) and "frenchi" (right).

In the Mackay district, frenchi damage is confined to forest country and shows up from October to December, whilst under normal circumstances grey-backs attack cane mostly in country of the scrub and creek flat types from February to June. To date, for various reasons, no satisfactory method of reducing frenchi damage by fumigation has been devised; this method is therefore applicable to grey-back attacks only.

#### Purposes of Fumigation.

We can now take up a discussion of the why, when, where, and how of fumigation. Firstly, *Why fumigate?* Over a period of many years, numerous suggestions have been made regarding measures for lessening grub damage to cane, but time and field experience have shown some of them to be uneconomic, unreliable, impracticable, useless, or at best to be of value under very limited conditions, while others may only be used successfully as supplementary or secondary aids. Up to the present, fumigation has proved to be the only reliable method of profitably reducing grey-back grub damage in specific fields or parts of fields. Farmers should not hope, and others should not claim, that fumigation will be of any additional value in the fight against grubs; it may be used to save grub-infested fields and nothing more. Undoubtedly, whilst so doing, large numbers of grubs, and therefore potential beetles, are destroyed. Nevertheless, there are no good reasons why this form of grub control should be considered other than as an ordinary farm would have.

### Investigation Methods.

Secondly, *Where to fumigate?* On "grubby" farms a systematic search for grubs should be made about six weeks after beetle flights. This search or survey consists in thoroughly examining the soil for all stages of grey-back grubs on either side of certain stools, selected so that when prospecting has been finished a stool near the centre of each square chain of field will have been examined. Digging should commence in the centre of the interspaces, working in towards the stools, which need not be removed if the work is done at the right time. The number of grubs found around each stool should be counted and recorded. Too much emphasis cannot be placed on the systematic nature of this digging; spotting and uncompleted, or haphazard, examinations are quite useless, and it would be better for all concerned if they were never attempted. Digging seldom exceeds 1 foot in depth; usually it varies from 4 to 8 inches. The results of completed surveys should be properly recorded in books as supplied by the Mackay Pest Board for the purpose.

14	12	7	0	0	8	12	30	2	0	13
6	6	17	8	10	17	29	7	7	5	5
7	15	2	0	3	6	11	6	8	10	0

FIG. 6.—Grub survey map of a heavily infested field. The counts were obtained by excavating one stool near the centre of each square chain of field. Systematic records such as this are essential for successful work.

Having completed records, it is now necessary to examine these grub maps (see Fig. 6) and decide where it would be profitable to fumigate. According to H. G. Knust when discussing fumigation in North Queensland (see the 1934 Proceedings of this Society) an average of three or more grubs per stool makes fumigation absolutely necessary in the Tully District. Up to the present such a ruling has not been made for the Mackay district, as it is considered it would be dangerous. Here we have several commercial cane varieties, numerous soil types, comparatively small farms, the likelihood of dry April-June periods, patchy grub infestations, and considerable variation in crop quality. We know that, under certain conditions, P.O.J. 2878 will yield satisfactory tonnages and c.c.s. content, and a good ratoon stand, with an even field average of seven grubs per stool. Furthermore, it is possible for one grub to damage seriously a well-grown stool of plant M.1900. To date, practical small farm management has forced those in charge of fumigation in this district to deal with each farm as a separate problem. Firstly, infested spots must be accurately defined by extra digging (Fig. 7); often differences in contour or soil type help in this work. With these maps, previous grub experiences, and other farm conditions as a basis, due consideration is then given to fumigation both as a profitable farm project and as a desirable insurance against grub damage if the April-June period to follow turns out to be a dry one.



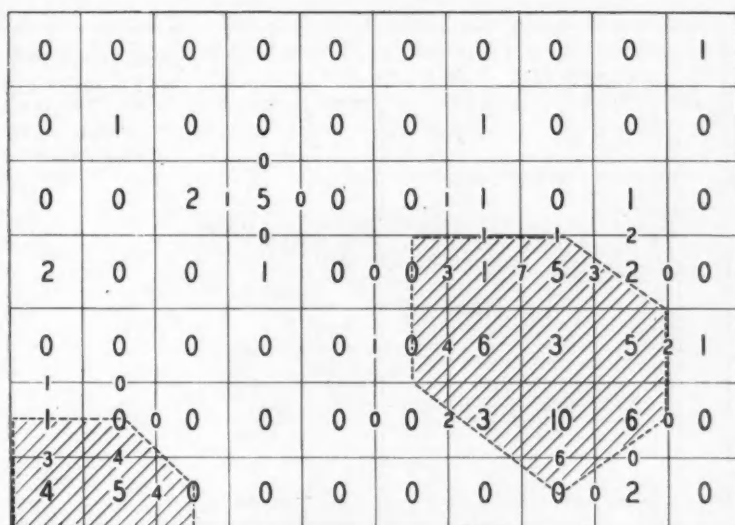


FIG. 7.—The above chart illustrates the survey figures for a "patchy" field. Extra diggings adjacent to the original sites serve to define the patches which should then be fumigated (e.g., the shaded area of this chart).

### Time of Fumigation.

*When to fumigate?* Fumigation should be commenced when grubs are near the stools, but are doing the minimum of damage, and when the soil is neither too wet nor too dry. Usually, if weather conditions permit, this would be some ten weeks after the last flight of beetles (see Fig. 8). First and second stage grubs seldom seriously attack the roots of cane—it is the larger grubs which do the damage. Under ideal conditions all grubs would be near the stools at the same time and all in the smaller stages. Occasionally this condition is attained in the field, but more often, at least, in the Mackay district, there is more than one flight of beetles, and we have to deal with an irregularly dispersed mixture of all stages. To date no reliable method of quickly forcing smaller stage grubs towards the stools has been discovered. Timing of fumigation, therefore, becomes a matter of judgment; if done too early grubs some distance away from the stools may escape the effects of the fumigants, and at a later date, after converging on the rooting systems, may damage the crop. If the work be left too late, the cane may be so severely damaged that fumigation, although it will undoubtedly kill the grubs, may not show any profit to the farmer. If at any time a choice has to be made between the two evils, it is better to be a little late than too early.

Concerning soil moisture conditions at the time of fumigation, it can be stated that, if the work is done when moisture is scarce, poor grub kills will be obtained and, in addition, the cane, especially younger shoots, may be killed by the fumigants. (This is one of the minor reasons why fumigation to stop frenchi damage in October to December is not recommended.) Fumigation under wet soil conditions also may result in unsatisfactory kills and at the same time have deleterious effects

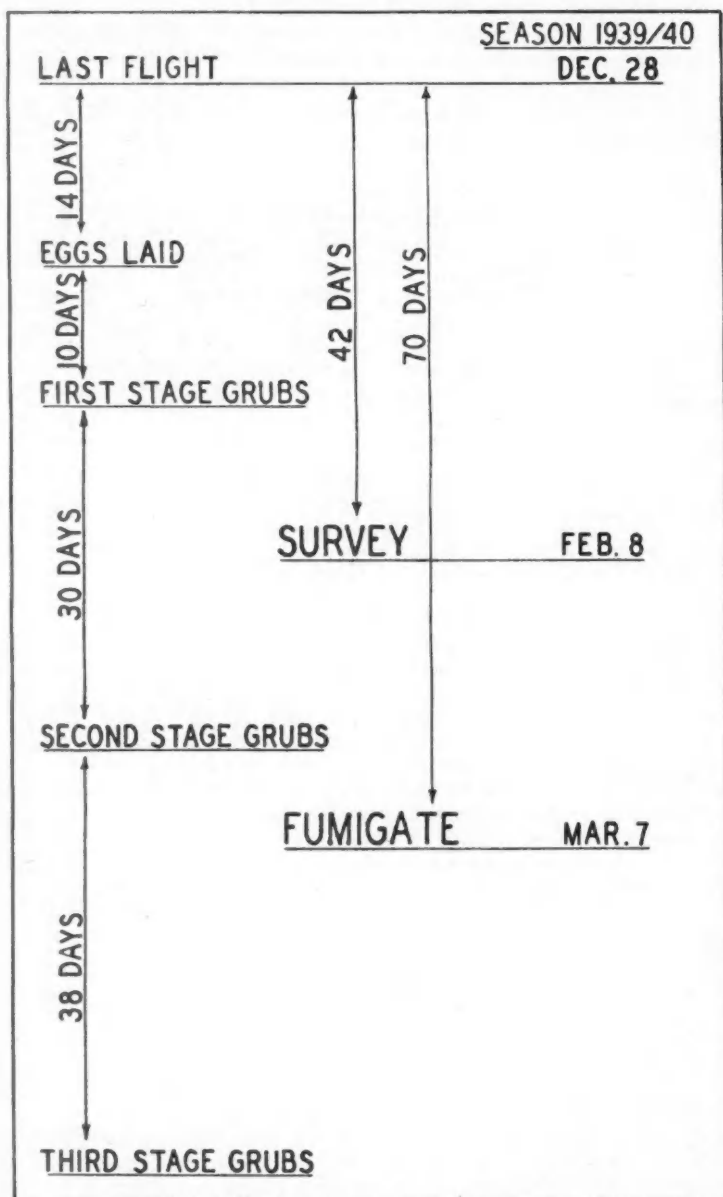


FIG. 8.—Timing of surveying and fumigating depends upon the period of beetle flights and subsequent behaviour of the grubs. This chart illustrates the inter-related factors.



on the crop. The cane is seldom killed outright, but a yellowing-off for three or four days may be noticed; often the cane apparently recovers, but this recovery is not always all it may seem. A good yield may be gained from the treated crop, provided sufficient grubs have been killed, but under Mackay conditions the ratoon stand may be unsatisfactory.



FIG. 9.—Illustrating the knapsack type of fumigant injector.

#### Fumigation Process.

*How to fumigate?* The actual fumigating itself consists of injecting a mixture of carbon-bisulphide and paradichlorobenzene (two parts to one) in 4 to 4½ cubic centimetre doses into the soil at a distance of 4 inches from the stools. Under normal conditions each side of the rows is treated with injections about 12 inches apart in good plant crops, the work being carried out with a hand operated machine of the Vermorel, Danks, or Blundell types. The latter, a knapsack variety of pump, is the more modern; it is faster, easier on the operator, less trouble to keep in continuous working order, and more suitable for use in large cane. Holes in the ground made by injector spears *must* be sealed, and this is usually done by a stamp with the heel of the boot of the operator.

Carbon-bi-sulphide is a very volatile and highly inflammable liquid with a distinctive odour; paradichlorbenzene is a white crystalline material which dissolves in the carbon-bi-sulphide. The vapour of the latter, which is a sudden killer, quickly spreads downwards and soon ceases to function. The paradichlorbenzene remains in the form of small crystals and persists, for some time, in sufficient concentration to kill grubs higher in the soil or reasonably distanced from the stools at the time of injection.

#### Costs and Organisation.

After having spent some time on the more technical side of fumigation we can now proceed to two other important aspects, viz., cost and organisation. Normally 150 to 180 lb. of the mixed fumigant is needed to treat an acre of grub infested cane, but the amount varies somewhat under different weather, soil, and crop conditions; the present cost of this material approximates to £6 5s. With the Blundell injector an average performance would be half-an-acre per man per day, i.e., cost of labour is about £1 15s. 6d. per acre. Full cost of fumigation is therefore £8 13s. 6d. per acre when allowing 3s. per acre as freight or cartage on the fumigants from the local distributing centre to the farms. At the present time, the Mackay Pest Board subsidises fumigation to the extent of 50 per cent. of the cost of the fumigants and supplies injectors free of charge; this reduces cost of fumigant to the farmer to £3 2s. 6d. per acre and total cost of the job to £5 1s. per acre when labour, other than that of the farmer and family, is used. It should be pointed out that this price should be taken only as a fairly accurate guide; several conditions may alter cases and some good work has been done at a cost as low as £2 10s. per acre. On the other hand, one exceptional effort cost £12 10s. per acre. To many the cost of fumigation may seem rather heavy, but successful and efficient work assures profitable crops and eliminates some unnecessary losses of ratoon stands.

#### Conclusion.

It is hoped that the foregoing remarks, and information as to costs, have demonstrated that fumigation is a project which should not be undertaken without competent assistance for those who have not a good working knowledge of the subject. Moreover, it is a job which is best left alone if it is not done in a thorough manner. To overcome some of these difficulties, fumigation is usually placed under the supervision of a district field officer responsible to the local Pest Board. So far as this is concerned, the Mackay district (Plane Creek Mill area excluded) has lately come into line with other grub infested areas. However, this district is large and cane areas scattered, and good organisation by the central authority, and whole-hearted co-operation between it and those farmers experiencing grub losses, are needed to get the maximum economic benefits that fumigation offers. There is one point in this regard which has become evident over the past two years and which could be mentioned now, and that is deficiencies in both quantity and quality of grub survey maps. Good maps are fundamental to economic fumigating and satisfactory surveys cost only about 3s. per acre with hired labour. It is, therefore, to be hoped that the present standard of mapping will be improved in the near future.

In conclusion, it can be stated that no harmful effect of the fumigants carbon-bi-sulphide and paradichlorbenzene on the soil itself have been reported or noticed at any time.

## Seedling Raising at Bundaberg and Some Notes on Q. 25.

By N. J. KING.

THE year 1940 marks the distribution of the first locally-produced sugar-cane seedling from the Bundaberg Experiment Station. Seedling raising began in Bundaberg in 1930 when some 350 seedlings were raised from seed in a hot-box. Previous experiment had shown that seedlings could not be obtained from local seed as the arrows in South Queensland did not set fertile seed; consequently all seed supplies are obtained from the Northern Experiment Station. From 1930 onwards seedling raising rapidly advanced with improvement in technique, more suitable facilities for germinating the seed and handling the seedlings, and the installation of watering facilities. It was not until 1935, however, that the present irrigation plant was installed—a prime requirement in seedling work—thus placing seedling raising on a basis where it was independent of droughts; and it was only in 1937 that the present glasshouse with its heating system was built for the germination of the seed.

It has frequently been a source of complaint from growers that no Bundaberg seedling has yet even been distributed to compete with the standard varieties—much less established its superiority over them. When all aspects of the work are considered, it could hardly be expected that the seedling raising programme could have borne fruit before this.

When the work began in 1930 the standard varieties of Bundaberg were D. 1135, M. 1900, and Q. 813, and the only disease problem of the day was gumming. It took some two or three years to find out what combinations of parents conferred gumming resistance on their progeny, and a fair amount of knowledge is now available covering this aspect of the work. In 1933, however, the distribution of P.O.J. 2878 was made, and at the same time P.O.J. 213 was being planted on a commercial scale; thus it appeared that the gumming problem would be solved by these two canes which were also more vigorous than the previous varieties. The year 1934 saw the distribution of Co. 290, P.O.J. 2725, and P.O.J. 234, all highly resistant to gum. The district now had five good varieties with high gum resistance and all with better vigour than the old standards.

What effect did this have on the seedling programme? When the seedling work began in 1930 the goal in view was to produce canes as good as D. 1135 and M. 1900, but resistant to gumming disease. In four years the picture was entirely changed, and the objective became the production of seedlings equal at least to these fine productions of Java and India. There is little doubt that P.O.J. 2878 from an agricultural standpoint is the finest variety ever introduced into Southern Queensland, but Java had been raising 80,000 seedlings a year for very many years before producing this "Wonder Cane." At the present time the Bundaberg Station is raising 6,000 seedlings a year—6,000 new varieties every twelve months—for selection and trial. And it must be remembered that we, in Queensland, require more of a seedling than do any other of the sugar-cane countries of the earth. Firstly, Queensland produces the sweetest cane in the world, therefore our

standard of sugar content is higher than in other countries and we have a higher standard to reach with our seedlings. Secondly, we consider ratooning ability as a prime factor, whereas Java, for example, is not interested in ratoon crops and has not to consider this virtue in evaluating a new seedling. Thirdly—and this is of great importance—we in Bundaberg have four serious diseases of cane to contend with in gumming, mosaic, Fiji, and downy mildew. Consider the P.O.J. canes from the viewpoint of our diseases. P.O.J. 2714 is fairly resistant to mosaic but highly susceptible to gumming, Fiji and downy mildew; P.O.J. 2878 is resistant to mosaic and gumming but very susceptible to Fiji and downy mildew; P.O.J. 213 is resistant to gumming and Fiji but susceptible in a high degree to mosaic and downy mildew; and P.O.J. 2725 is resistant to gumming, mosaic, and downy mildew, but susceptible to Fiji disease. None of these, therefore, is the ideal cane, pathologically, for growth in this diseased area.

Observe, then, how the difficulties for the seedling raising station have increased. Gumming has been overcome by the P.O.J. canes and Co. 290, but 1938 saw a wholesale spread of Fiji and downy mildew in the Bundaberg area. Seedlings at that time which had stood the test of gumming resistance trials and had promise as good agricultural varieties had to be discarded because of their susceptibility to Fiji and/or downy mildew diseases.

Records over the past ten years show in no uncertain manner how the newer varieties have affected district production and the grower uses these varieties as a yardstick with which to compare any new productions. P.O.J. 2878, as stated above, has no peer in South Queensland as an agricultural variety, but it is expected—rather unreasonably—that any later variety will be superior to P.O.J. 2878. But this Javan "Wonder Cane" is susceptible to downy mildew and Fiji, our most serious diseases, and if a new seedling cane is produced which is resistant to these diseases, then it is almost certain that some of the valuable agricultural features of P.O.J. 2878 will be missing in the newcomer. The ideal all-purpose cane, resistant to all diseases, has never been produced and it remains doubtful whether it ever will. When all the requirements of the ideal cane are written down they make a formidable list.

Let us now consider the history of Q. 25 and note down its good and bad features. It is nearly six years since this variety was first selected in the field as a promising looking seedling. Its parents are:—Female, P.O.J. 2875, and Male, H.Q. 409. The former is a P.O.J. cane which never attained prominence in this or any other country, and has certain undesirable features in poor stooling, prominent eyes and susceptibility to downy mildew and Fiji diseases. H.Q. 409 was a seedling raised at Hambleton many years ago and which still represents some 12 per cent. of the crop produced north of Townsville. It is resistant to gumming and moderately resistant to downy mildew.

Q. 25 itself is resistant to gumming and downy mildew, but susceptible to mosaic and Fiji. Its resistance to downy mildew is considered to be its principal virtue, especially at this stage of the industry in Bundaberg. During the years the seedling has been growing on the Experiment Station the following observations have been made

and confirmed. The variety is a thick cane—thicker than P.O.J. 2878—and with an internode about 4 inches long under normal growing conditions. It has very few hairs on the leaf sheath, and the leaf edges are not so sharp as with the P.O.J.'s. It is very upright in early growth, similar to D. 1135, and is a very good striker and ratooner. Like P.O.J. 2878 the strike is slow if weather is too cool. Planted in the warmer months it is a quick germinator. Later growth—when there is some four or five feet of stalk—is inclined to be somewhat untidy. The stalks spread slightly as do stalks of Oramboo. At the same time the crop does not fall over easily. A 50-ton crop has stood quite well on the station. The cane is not a heavy stooler, but the sticks are thick and very weighty. Cover in the young cane is not good owing to the upright character of the growth. Consequently it probably will not suit dirty and weedy country; a variety with good, early cover is best on such land.

Some production figures over the past few years are available, and it should be borne in mind that these crops were not irrigated at any time.



FIG. 10.—Showing a crop of 16 months old Q. 25, with young ratoons alongside.

A varietal yield trial planted in spring 1936 gave the following results:—

	Plant Cane.		1st Ratoon.	
	Tons per Acre.	C.C.S.	Tons per Acre.	C.C.S.
Co. 290 (average of seven plots) .. ..	16.0	14.1	33.4	13.8
Q. 25 (one plot only) .. ..	26.0	14.8	47.8	16.5

A Latin square trial planted in spring 1937 has given these figures:—

	Plant Cane.		1st Ratoon.	
	Tons per Acre.	C.C.S.	Tons per Acre.	C.C.S.
Co. 290 (average of five plots) .. ..	39.8	14.3	30.4	15.2
Q. 25 (average of five plots) .. ..	45.4	16.0	32.8	17.2

The total of four crops from the two different experimental trials covering the years 1936 to 1939 are therefore—

152.0 tons of Q. 25 at an average C.C.S. of 16.12

119.6 tons of Co.290 at an average C.C.S. of 14.35

These favourable figures and the previous description of the cane would perhaps create in the mind of the grower the idea that Q. 25 is better than P.O.J. 2878. This is not claimed for one instant. On the debit side of the ledger we find that the variety is quite susceptible to Fiji and mosaic, that it does not cover in well, and that we have no experience to indicate whether it will prove a suitable standover variety. These points should be kept in mind when deciding whether and where to plant Q. 25.

In spring 1939, a large number of plots of Q. 25 were planted out in the district, covering all major soil types as well as irrigated and dry conditions. The past nine months have given us an opportunity to assess its value under these varying environments. In all cases the variety is ahead of the adjoining standard variety in growth and general appearance, and without making any wild claims it would appear that Q. 25 will compete with any of the present approved varieties for one-year cropping. As stated above the standover characteristics of the variety must still be tested. A pleasing feature of the 1939 plots of Q. 25 in the district was that in the few places where it was grown no sign of arrowing appeared although it was a heavy arrowing year.

Arrangements have been made for the distribution of the variety in the Bingera, Fairymead, Gin Gin, Millaquin, and Qunaba mill areas. The proposed distribution was freely advertised and by this time applications will have closed. Just a word of warning in regard to the matter. **Q. 25 is not yet on the approved list.** It will be necessary for the Director of the Bureau of Sugar Experiment Stations to supply the mills next year with a list of all authorised growers with Q. 25 so that the variety may be classed as experimental cane. This list will be taken from the distribution list. Any grower, therefore, who may apply for, say, 2 tons of Q. 25, and plant 1 ton on his own farm and supply the other ton to a neighbour (by previous arrangement) is doing the neighbour a disservice. The mill will then not have the neighbour's name authorised to plant Q. 25 and he will be penalised for being in possession of a non-approved variety. Each grower planting the Q. 25 must notify the experiment station or the canegrowers' office in Bundaberg so that the experimental list may be complete and any later trouble may be avoided.

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### Farmers' Cane Samples for Testing.

Each year, in the July Quarterly Bulletin, a note appears regarding farmers' cane samples. Such samples are tested by the local experiment station as a guide to the grower who desires to know which block on his farm is the most mature for harvesting purposes. Certain requirements in these maturity samples are laid down:—

- (1) The sample *must* consist of at least six stalks.
- (2) *Burnt* samples *will not be tested* in any circumstances.



- (3) Samples sent by rail must be prepaid. If the forwarding railway station is not open for payment of freight, the amount of 1s. per bundle is to be forwarded to the experiment station with the covering letter. By special arrangement with the Railway Department a flat rate of 1s. per bundle covers the freight on these samples.

The c.e.s. test obtained at the experiment station small mill is not intended to be a check on the mill tests and is useless for that purpose. Owing to the number of samples being delivered to the experiment station during the currency of a harvesting season it is not possible to carry out separate tests on tops, middles, and butts as is frequently requested.

The small mill test has a definite value in assessing relative maturity of a number of blocks of cane, providing the sample is collected with care. Six stalks from a few square yards of a 10-acre field is quite valueless, since the sugar content of the block may—and probably does—vary from one part of the field to another. The sample should be taken diagonally across a block—with due regard to the percentage of short and tall stalks. Suckers should not be included.

N.J.K.

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## The Recent Burdekin Flood and its Lesson.

By H. W. KERR.

THE Lower Burdekin district experienced the most disastrous flood in its history, following a cyclonic storm on the 7th April last. Torrential rains fell, and nearly 21 inches were recorded in the district. During the night of the 7th, the Burdekin River rose unusually rapidly, and by the morning of the 8th the water was 20 feet over the railway bridge. It continued to rise during the day, and broke its banks on both the Ayr and Home Hill sides. The rapid rise of the flood waters was, fortunately, not accompanied by loss of life, though there were a number of narrow escapes. Moreover, as little flood water reached the river from its higher tributaries, the subsidence of the stream was also comparatively rapid.

The effects of the cyclone and flood were particularly severe, and a survey of the area revealed the tremendous losses which some farmers had incurred. Not only were buildings and crops severely damaged, but erosion of the stream banks at many points allowed the waters to pour through and create new channels. At this period of the year, many farmers had already tilled their lands in readiness for early planting, while in some cases the fields had actually been planted. The rush of flood water over such lands was, of course, disastrous; in many places the entire surface soil was removed to plough depth, while in others the erosion removed the subsoil strata as well, to a depth of several feet. On certain farms, what were once fertile canefields are now lagoons; on others, the sand scoured by the stream from the alluvial subsoils was deposited from 1 to 6 feet deep in fields of mature cane. In a few instances, mainly on low-lying farms or fields, the checking of the speed of the waters permitted the deposition of silt. This had

generally been carried from eroded fields, and it represented the most fertile portions of such lands. Though this valuable deposit was usually only one or two inches in thickness, one farm received a layer of twelve inches on a low-lying field.

Shortly after the calamity, visits were paid to the area by Messrs. Bell and Kerr, of the Sugar Experiment Stations staff. Mr. Bell was delegated to co-operate with local officials for the purpose of estimating the financial loss which the district had suffered. Dr. Kerr later inspected the majority of the damaged farms for the purpose of advising the growers what they might do to overcome the adverse field conditions which have been created. Samples of eroded soils and subsoils, sand and silt deposits, were transferred to Brisbane, where they were analysed, and reports submitted to the growers concerned. On the basis of these results a general report was also prepared and circulated amongst farmers whose lands had suffered damage.



FIG. 11.—Showing a deep gully on a river alluvial farm. This was formerly a fertile cane field.

Though, in many cases, the actual permanent damage to the farms may not be so great as was at first anticipated, a large area of what was formerly first class land must be at least temporarily thrown out of production. The irrigation question here introduces a complication from which other cane areas would be free in similar circumstances; and whereas only a small portion of many blocks may have been lost through gullying, the land surface is now so seriously broken that further irrigation of the fields becomes such a problem as to render the practice uneconomic. After a period of years, and when the blocks have been extensively graded, it may be possible to bring them into production once more.

It should be pointed out that the damage done on many forest soil farms, though much less obvious and spectacular than that on the river alluvial lands, is actually much more serious in its effects. With deep silty soils, the loss of even 2 feet of original soil often exposes a fresh surface but little inferior in quality to that removed. But where 12



or 14 inches of grey forest soil is washed away, and a stiff, intractable clayey subsoil is exposed, the rehabilitation of such land would often be so costly and laborious as to render it impracticable. While the Burdekin lands as a whole are notoriously deficient in humus and nitrogen, the forest subsoils are almost devoid of these constituents.



FIG. 12.—Illustrating the manner in which the surface soil was eroded from a recently ploughed field; forest soil.



FIG. 13.—A deep bed of sand was deposited on this fallow field and in the adjacent cane.

The analyses of the sandy deposits are very interesting. We have repeatedly pointed out that the Lower Burdekin soils are the richest of all the cane areas of the State: but it was not expected that the sands from the subsoil would exhibit anything like the reserves of plantfoods which were actually found. In no case was a fine sandy deposit tested

which could be expected to derive any benefit at all from applications of phosphate and potash; but they do lack nitrogen, and any attempt to grow cane crops on such areas will fail, if due regard is not paid to the supply of this plantfood in the form of suitable manures. The use of dried blood (or meatworks manure) in the drill with the cane plants, followed by two or three top dressings of sulphate of ammonia will be essential for successful crops. The major problem which many of the sands present is their droughtiness, necessitating frequent irrigations: but if the cane crop can be carried along to the point where the roots penetrate the original buried soil, success should be assured. The depth and fineness of the sand is therefore dominant. A light sandy layer on a heavy soil type must, on the other hand, be regarded as an advantage: when ultimately worked into the soil, the production and tillage qualities of the land should be distinctly improved.



FIG. 14.—Showing how the flood waters washed out and destroyed concrete water-piping.

Though many farmers have suffered severe losses of both crop and land, and a few farms have been totally destroyed, the greatest menace to the future of the district lies in the presence of some ten or eleven openings in the river bank which would permit even a moderate flood to break through and devastate the farms which lie in the path of the new channels. This is clearly appreciated, and the Government has lost no time in having the situation fully investigated by its officers, so that the danger may be removed.

#### The Lesson of the Flood.

What has happened this year in the Burdekin area is suggestive of what might befall any of our cane districts should the local streams

become suddenly swollen to abnormal dimensions by unusually heavy deluges: and it is well to enquire into the causes of the damage which the Burdekin district experienced to deduce whether the losses were unavoidable, or in how far they may have been prevented; and to what extent clearings of natural vegetation, with cultivation of the land, have contributed to the damage.



FIG. 15.—This was formerly a canefield, carrying an excellent plant crop.



FIG. 16.—Showing how an irrigation pump and concrete piping were damaged when the bank was eroded.

The subject of soil erosion generally is one which is daily receiving closer attention by agriculturists the world over. The discussion of the subject at the 1940 Conference of the Queensland Cane Growers' Association was timely, as it served to focus the attention of Queensland cane growers on a subject which has, to date, been treated in only a cursory fashion by those who should be vitally concerned with this menace.

The present problem of the Burdekin district is, primarily, one of preventing the erosion of the river banks, the breaks in which were responsible for the devastating torrents making their way to lagoons or other low-lying areas. But a study of the results will teach us many useful points which cannot be disregarded.

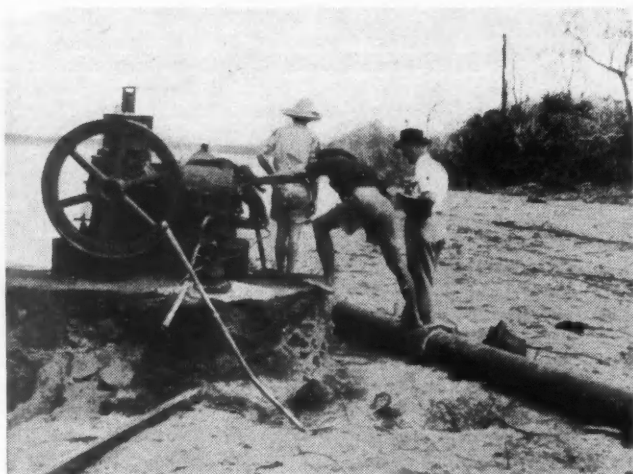


FIG. 17.—This engine and its concrete bed were moved by the force of the flood.

In general, the banks were most extensively washed away at those points where the natural or artificial vegetative cover had been removed. It was interesting to observe particularly that where the banks were covered by grasses—notably Guinea—the matted roots of these species, combined with the check in flow which the stems offered, assisted very materially in preventing the loosening and removal of the soil. The presence of larger trees was also effective in one or other of these directions, and was most effective, of course, where the trees existed in association with Guinea grass, Japanese bamboo, etc. Where the farmer had destroyed the river bank vegetation or disturbed the bank, and particularly where the cultivation was carried to the top of the bank, devastating results followed. Under these conditions a swiftly running body of water readily removes the exposed, undisturbed soil; and where these river bank blocks had been ploughed just prior to the flood, the removal of soil to plough depth encountered no resistance whatever. With soils containing a moderate percentage of clay particles, repeated ploughing to a uniform depth had consolidated the underlying soil or subsoil to such an extent as to enable it to offer definite resistance to

erosion, and many blocks of this nature were washed to the depth of the plough pan only; but river alluvial soils, containing a preponderance of silt and fine sand, lack this capacity, and were eroded to a depth of many feet in certain instances.



FIG. 18.—A low-lying fallow field which has benefited from a deposit of silt.



FIG. 19.—This field received a deposit of rich silt twelve inches deep.

It was interesting also to observe the effects of the running water when it invaded mature fields of cane. Although the intervening field may have been badly eroded, the waters entering the cane were checked

in velocity due to the obstruction of the cane stalks, while the matted roots also held the undisturbed soil together. The net result was a deposition of sand, due to the check in water-flow, but in few instances did such fields lose any soil.

The inference from these observations is clear; at all times the farmers concerned should keep the river banks clothed in vegetation, and Sudan grass appears to offer most in this particular district: cane cultivation should not be carried right to the bank of the stream, but should cease at least one chain further back, and the strip between the cane field and the river should be kept continuously under grass and forest cover; finally, it would be a further protection if river bank fields were allowed to remain undisturbed under volunteer ratoon cane until at least May of the year in which the field is to be broken up for planting. Admittedly, the last recommendation would handicap the farmer in the preparation of the land, as well as necessitating late planting; but the presence of the light ratoon growth, on an undisturbed soil, would be definitely effective should a similar emergency arise. In any event, the cane crop makes rapid growth on rich alluvial soils, and under these conditions, also, repeated ratooning may be practised, again to advantage.

Though it is "gully" erosion such as occurred in the Lower Burdekin area which is most striking, farmers should not forget that the less obvious "sheet" erosion, which takes place on every field from which excess water flows at a measurable velocity, is responsible for even more damage over a period of years. An excellent example of the insidious nature of this cause is afforded by hillside areas of red soil, such as occur at South Johnstone and Childers. The decline in fertility on certain farms has already given cause for alarm, and where the process is allowed to go unchecked, the productivity of the land declines at an ever-increasing rate.

This subject is one which has already received the attention of the Bureau, and in the near future one of our officers will make a more intensive study of the causes and effects of existing conditions, and attempt to devise means for their amelioration.

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### Grub Damage to the Variety S.J. 2.

Due to its extremely high sugar content the Queensland raised seedling S.J. 2 has in recent years gained considerable favour in the Mackay and Lower Burdekin districts. Although not a heavy cropper, the cane returns good yields of sugar per acre in these areas and is a good cane to work. Unfortunately, it has a comparatively weak rooting system and, as a result, is very susceptible to damage by the Northern cane grub; in fact, it might be said to be the most susceptible variety now grown commercially. We would advise any farmers who might contemplate planting the variety to give full consideration to the possible grub situation. In those areas where grub damage is at all likely, then the variety should only be planted where growers are prepared to conduct an annual grub fumigation campaign. Experience in the Mackay district indicates that an average of only two grubs per stool is sufficient to render fumigation imperative.

A.F.B.



### Prosecutions for Failure to Comply with Disease Eradication Orders.

In pursuance of a determined effort to effect a rapid and extensive improvement in the outbreaks of downy mildew and Fiji diseases in the southern districts, over 200 disease eradication orders were issued during the 1939 crushing season. It is satisfying to be able to record that the co-operation extended to the Bureau in this distasteful duty was very gratifying, and in only three cases were prosecutions launched. These occurred in the Mackay district, and in each case the defendants pleaded guilty and were fined.

The position in regard to these diseases is rapidly improving and, although further orders must be issued this season, it is expected that by the end of 1940 the situation should be normal again.

A.F.B.

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### Variety Q. 13.

The seedling cane known as Q. 13, which was bred in North Queensland, has been tested in a number of varietal trials during the past two years. It exhibited definite promise in respect of both yield and C.C.S., and it was suggested that the cane might later be added to the approved variety lists in those parts.

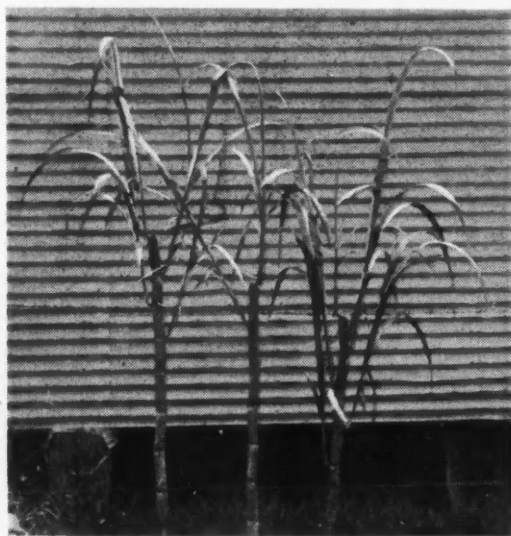


FIG. 20.—Illustrating the manner in which Q. 13 was damaged by heavy winds, with subsequent side-shooting.

However, the cane has not proven entirely satisfactory from a ratooning point of view, while it exhibits a measure of susceptibility to certain diseases. During the past summer it was also found to suffer severely from wind damage. The accompanying photograph shows the





FIG. 21.—General view of Australian Court, Toronto Exhibition, 1939. Sugar display, second on left.

results of the cyclonic blow which was experienced during February in the Cairns-Townsville areas. In two or three plots of Q. 13 as many as 40 per cent. of the tops were broken at the growing point, and thereafter side shooting took place.

Considering all features of the cane, it is now agreed that it does not possess sufficient merit to warrant its general propagation, especially as Q.10—a variety similar in many particulars—has been released for general planting this year.

H.W.K.

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### Sugar Display at Toronto, Canada.

In response to a request from the Canadian Government, the sugar industry prepared a display typifying a Northern sugar-cane farm, and this found a prominent place in the Australian exhibit (see Fig. 21) at the National Exhibition held at Toronto in 1939.

The sugar display was very favourably commented on, and interest centred in the sticks of Queensland-grown cane which were despatched in cool storage. The Canadian authorities propose to use the display again this year, and arrangements for the consignment of further canes will be made at an early date.

Canada is now a substantial customer, and, doubtless, in the future even larger consignments of raw sugar will be despatched from Australia to our sister Dominion.

H.W.K.

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### Planting of Varieties Q. 10 and Oramboo in North Queensland.

It is expected that during the coming spring there will be considerable plantings of the varieties Q.10 and Oramboo, particularly in the areas north of Babinda, and it is considered advisable to direct the attention of farmers to the following points regarding the disease resistance of these varieties.

Both are resistant to gumming disease and may be planted with confidence in areas where gum has been found. On the other hand, Oramboo has shown some susceptibility to leaf-scald disease, and care should be taken to consult officers of the local Disease Control Boards, or the Bureau, as to the suitability of proposed sources of plants. Leaf-scald is most prevalent in the wetter areas, and it is unfortunate that hitherto the main plantings of Oramboo have been in the wetter parts of the Mulgrave and Mossman districts. Where a grower has a choice between plants from wet and dry districts, he should, generally speaking, give preference to the dry district; the reasons for this are that diseases spread more slowly in dry districts, there is considerable "self-cleaning" due to death of diseased plants in dry weather, and there is less masking of symptoms. Leaf-scald is spread by the cane knife, and both the purchaser and the vendor of plants should see to it that plants are cut with clean knives.

Q. 10 is somewhat susceptible to mosaic, and, although this disease has never been of much consequence in North Queensland, it is, of course,

very desirable that it should never be allowed to get a foothold. Bureau or Disease Control Board officials should again be consulted as to suitable sources of plants, and the farmer, when cutting plants, should be on the lookout for diseased stools and pass them by. Diseased stools should be dug out of young fields on sight. Like leaf-scald, mosaic is more likely to be prevalent on wetter or river and creek flat country.

In the case of Q. 10, its rapid and tall growth and consequent tendency to lodge make it a rather undesirable type of cane for wet areas and rich soils, where mosaic and leaf-scald are also worst.

A.F.B.

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### Ordering of Fumigants.

During the past season many farmers were embarrassed by having insufficient fumigant to carry out the destruction of grubs in as much of their infested area as they desired, and when further stocks were ordered from the South, they were faced with the fact that shipping companies object to carrying carbon disulphide in the hotter months of the year owing to the risk incurred.

So far this year, in order to obviate shortage as far as possible, and have the fumigant transported during the cooler weather, a number of mills and pest destruction boards have notified their suppliers to place orders immediately. In case farmers in any areas have not received such notification, we would here advise them of the necessity for ordering their requirements at an early date so as to avoid some of the serious loss which occurred last season due to inability to obtain further supplies of fumigant from the South during the summer, at a time when it was urgently needed.

J.H.B.

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### Cane Growers' Handbook.

Spare copies of "The Queensland Cane Growers' Handbook" have been supplied to the Secretaries of the Mossman, Cairns, Innisfail, Tully, Herbert River, Ayr, Proserpine, Mackay, Bundaberg, Isis, Maryborough, and Southern District Cane Growers' Executives. These will be available, on application, to those growers who have not yet received their copies, or to new growers desirous of receiving the book. Application should be made direct to the local District Executive Office.

H.W.K.

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### General Levy for 1940-41.

For several years past, the levy collected for the purposes of the Sugar Experiment Stations has been fixed at 3d. per ton of cane delivered to each mill in Queensland. The levy is borne in equal parts by both miller and grower. The levy for 1940-41 has again been fixed at the same figure.

It is of interest to note that the contribution made by a farmer producing 1,000 tons of cane each year, is just over 30s. per annum. It rests with the farmer to decide whether he is to avail himself of the services offered by the Bureau to this extent.

H.W.K.

